

# PATENT ABSTRACTS OF JAPAN

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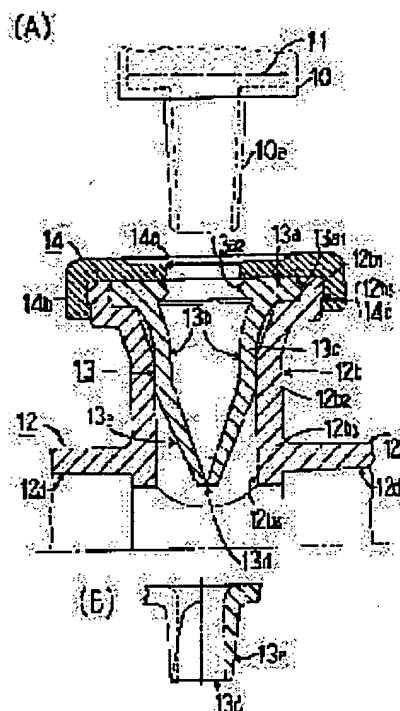
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## (54) MIXING INJECTION TUBE

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a mixing injection tube having no injection needle for preventing a back flow of blood.

SOLUTION: An injection valve 13 having a base section 13a air-tightly contained engaging to a divaricate section 12b of a side section of a tube main body 12a, a trunk section 13c having an injector main body 10 on its inner periphery or a compressed section 13b of a tip small diameter tube section 10a, and a tip section 13f having a reverse stop valve 13e for tightly closing minus pressure produced within the trunk section 13c by pulling the injector after injecting is assembled through a lid body 14 to the divaricate section 12b of the mixing injection tube 12.



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CLAIMS

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[Claim(s)]

[Claim 1] Mixed injection tubing characterized by providing the impregnation valve which becomes the branch pipe part of the flank of the body of tubing from the point which has the check valve sealed with the base by which attachment hold is carried out airtightly, the drum section which has the press fit section of the body of a syringe, or its head minor diameter tube part in inner skin, and the negative pressure generated in a drum section by drawing of the syringe after impregnation.

[Claim 2] Mixed injection tubing according to claim 1 characterized by making the drum section inner skin of the 2nd inside impregnation valve possess the press fit section of the body of a syringe, or its head minor diameter tube part in order to equip with the 2nd impregnation valve which has a check valve airtightly in the drum section of said impregnation valve, to make a duplex equip with a check valve and to generate negative pressure at the time of drawing of a syringe.

[Claim 3] Mixed injection tubing according to claim 2 characterized by containing the 2nd impregnation valve which has the check valve of said inside possible [ predetermined distance and sliding ] along the press fit direction of the body of a syringe in the drum section of the 1st impregnation valve which has an outside check valve.

[Claim 4] Mixed injection tubing according to claim 2 characterized for said 2nd impregnation valve by predetermined distance and installing movable along the press fit direction of the body of a syringe through diaphragm into the drum section of the 1st impregnation valve.

[Claim 5] The base by which attachment hold is airtightly carried out into the branch pipe part of the flank of the body of tubing in said 2nd impregnation valve, The drum section which has the press fit section of the body of a syringe, or its head minor diameter tube part in inner skin, It constitutes from a check valve sealed with the negative pressure generated in a drum section by drawing of the syringe after impregnation. A drum section is met in the press fit direction of the body of a syringe in this base through diaphragm to the base of said 2nd impregnation valve. Predetermined distance, Mixed injection tubing according to claim 2 which installs movable, and uses the check valve of said 2nd impregnation valve as another object, and is characterized by making the periphery section of the check valve concerned pinch in the drum section of the 1st impregnation valve, and the base of the 2nd impregnation valve.

[Claim 6] Mixed injection tubing given in any of claims 1-5 characterized by forming said impregnation valve with spring materials, such as rubber, they are.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to mixed injection tubing used when pouring the liquid of a drug solution and others into the blood circuits of an artificial kidney, a drop-by-drop-titration circuit, etc.

[0002]

[Description of the Prior Art] For example, as an artificial kidney is shown in drawing 6, the difference of the osmotic pressure of blood and dialysing fluid 6 is used for the blood drawn from some patients 1 to the dialyzer 5 via the derivation piping 2, the pump 3, and the controller 4 within a dialyzer 5. From the inside of blood, wastes are removed, it returns to a patient's 1 inside of the body, and the mixed injection tubing 7 is connected in the middle of the middle of the return piping 8 from a dialyzer 5, or the derivation piping 2.

[0003] The conventional mixed injection tubing 7 fitted in the rubber stopper airtightly in the branch pipe part formed in the flank of the body of tubing which makes a pipe tee configuration, inserted the hypodermic needle in this rubber stopper part, and was injecting the drug solution within the body of a syringe etc. into it so that this might be penetrated.

[0004]

[Problem(s) to be Solved by the Invention] The drug solution etc. needed to be poured in using the hypodermic needle, it became that part and cost high, and, moreover, the used hypodermic needle had a problem on abolition because of adhesion contamination of a patient's blood, and the above-mentioned conventional mixed injection tubing 7 had the problem of the hospital infection by the accidental firing of this used hypodermic needle etc.

[0005] Then, this invention aims at offering mixed injection tubing which makes a hypodermic needle unnecessary and can make leakage of blood etc. there be nothing.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned object, mixed injection tubing of this invention is characterized by providing the impregnation valve which consists of a point which has the check valve sealed with the base by which attachment hold is airtightly carried out into the branch pipe part of the flank of the body of tubing, the drum section which has the press fit section of the body of a syringe, or its head minor diameter tube part in inner skin, and the negative pressure generated in a drum section by drawing of the syringe after impregnation.

[0007] If this invention makes the head minor diameter tube part of the body of a syringe press fit in the press fit section of the drum section inner skin of an impregnation valve, and seals the inside of a drum section at the time of impregnation of a drug solution etc., the piston of a syringe is pressed in this condition and the drug solution within the body of a syringe etc. is extruded from a head minor diameter tube part. The internal pressure in a drum section can rise, head opening of a check valve can carry out opening, and mixed impregnation of the above-mentioned drug solution etc. can be carried out into the blood which flows the inside of the body of tubing of mixed injection tubing. And since negative

pressure occurs in a drum section and head opening of a check valve is certainly sealed by this negative pressure in case a syringe is drawn out from drum section inner skin, after impregnation can prevent a back run and leakage of blood certainly. Thereby, mixed injection tubing of this invention can do a hypodermic needle as it is unnecessary, and it is made as there is also no back run of blood.

[0008] Moreover, in order that mixed injection tubing of this invention may equip with the 2nd impregnation valve which has a check valve airtightly in the drum section of said impregnation valve, may make a duplex equip with a check valve and may generate negative pressure at the time of drawing of a syringe, it is characterized by making the drum section inner skin of the 2nd impregnation valve which has an inside check valve possess the press fit section of the body of a syringe, or its head minor diameter tube part. In case a syringe is drawn out from drum section inner skin, the check valve of the 1st impregnation valve is made to seal, then negative pressure can be generated in the drum section of the 2nd impregnation valve, the check valve of the 2nd impregnation valve can be made to be able to seal, and a duplex can be made to prevent a back run and leakage of blood first after impregnation of a drug solution etc. by this configuration.

[0009] Furthermore, mixed injection tubing of this invention is characterized by containing the 2nd impregnation valve which has the check valve of said inside possible [ predetermined distance and sliding ] along the press fit direction of the body of a syringe in the drum section of the 1st impregnation valve which has an outside check valve. By this configuration, after impregnation of a drug solution etc., in case a syringe is drawn out from drum section inner skin, the negative pressure which increased by the above-mentioned sliding distance in the drum section of the 1st impregnation valve can be generated. With this negative pressure that increased First, the check valve of the 1st impregnation valve is made to seal, then negative pressure can be generated in the drum section of the 2nd impregnation valve, the check valve of the 2nd impregnation valve can be made to be able to seal, a back run and leakage of blood can be prevented to a duplex, and it can consider as a much more positive thing.

[0010] Moreover, mixed injection tubing of this invention is characterized for said 2nd impregnation valve by predetermined distance and installing movable along the press fit direction of the body of a syringe through diaphragm into the drum section of the 1st impregnation valve. When this configuration draws out a syringe from drum section inner skin after impregnation of a drug solution etc., The negative pressure which increased by the above-mentioned travel of the 2nd impregnation valve installed through diaphragm in the drum section of the 1st impregnation valve can be generated. With this negative pressure that increased First, the check valve of the 1st impregnation valve is made to seal, then negative pressure can be generated in the drum section of the 2nd impregnation valve, the check valve of the 2nd impregnation valve can be made to be able to seal, a back run and leakage of blood can be prevented to a duplex, and it can consider as a much more positive thing.

[0011] Moreover, the base where attachment hold of the mixed injection tubing of this invention is airtightly carried out into the branch pipe part of the flank of the body of tubing in the 2nd impregnation valve, The drum section which has the press fit section of the body of a syringe, or its head minor diameter tube part in inner skin, It constitutes from a check valve sealed with the negative pressure generated in a drum section by drawing of the syringe after impregnation. A drum section is met in the press fit direction of the body of a syringe in this base through diaphragm to the base of said 2nd impregnation valve. Predetermined distance, It installs movable, and the check valve of said 2nd impregnation valve is used as another object, and it is characterized by making the periphery section of the check valve concerned pinch in the drum section of the 1st impregnation valve, and the base of the 2nd impregnation valve. While this configuration extends diaphragm by pressing the head minor diameter tube part of the body of a syringe fit in the press fit section of the drum section of the 2nd impregnation valve at the time of impregnation of a drug solution etc., a drum section is depressed caudad and the inside of a drum section is sealed. In this condition By pressing the piston of a syringe, opening of the inside check valve can be carried out, then opening of the outside check valve can be carried out, and the drug solution within the body of a syringe etc. can be poured in into mixed injection tubing. When drawing out the head minor diameter tube part of the body of a syringe out of the drum section of an inside impregnation valve after impregnation, It goes up, while a drum section extends diaphragm upward

together with a syringe at first. By this First, when negative pressure occurs in the point of the 1st impregnation valve, and an outside check valve seals, then the head minor diameter tube part of the body of a syringe slips out of the drum section. Generate negative pressure in a drum section, an inside check valve is made to seal, and diaphragm makes coincidence carry out the closedown of the inside check valve to this also according to an elastic operation. Thus, according to the 5th example, the check valve of a duplex can be made to be able to seal first from an outside thing, then an inside thing can be made to seal in order. Therefore, also in the 5th example, a duplex can be made to prevent a back run and leakage of the blood which flows the inside of mixed injection tubing, and a hypodermic needle is made as it is unnecessary.

[0012] Furthermore, this invention comes to form said impregnation valve in one with spring materials, such as rubber. Once being able to make the sealing action of the check valve by the negative pressure in a drum section perform softly smoothly and sealing it by this configuration, a back run and leakage of blood can be made to prevent certainly according to a check valve operation of check valve original, and the sealing maintenance operation by the elastic closedown force.

[0013]

[Embodiment of the Invention] Hereafter, the mode of operation of mixed injection tubing concerning this invention is explained based on a drawing. (A) of drawing 1 shows (B) of the vertical section side elevation showing the 1st example of mixed injection tubing concerning this invention, and drawing 1 with the front view of a check valve part, and shows a right half in a cross section. The vertical section side elevation showing the 2nd example which drawing 2 R> 2 requires for this invention, the vertical section side elevation showing the 3rd example which drawing 3 requires for this invention, the vertical section side elevation showing the 4th example which drawing 4 requires for this invention, the vertical section side elevation showing the 5th example which (A) of drawing 5 requires for this invention, and (B) are the top views of the check valve simple substance of the 2nd impregnation valve.

[0014] First, as the 1st example of mixed injection tubing of this invention is shown in (A) of drawing 1 R> 1 Base 13a by which attachment hold is airtightly carried out to branch pipe partial 12b of the flank of body of tubing 12a of the mixed injection tubing 12, Drum section 13c which has press fit section 13b of head minor diameter tube part 10a of the body 10 of a syringe in inner skin, It consists of point 13e which has 13d of check valves sealed with the negative pressure generated in drum section 13c by drawing of the syringe after impregnation, and branch pipe partial 12b of the mixed injection tubing 12 is equipped with the impregnation valve 13 which comes to form these each part in one with spring materials, such as rubber, through a lid 14.

[0015] The mixed injection tubing 12 consists of body of tubing 12a in which the pipe insertion openings 12d and 12d which carry out press fit junction of the pipe (graphic display abbreviation) of blood circuits were formed to ends, and branching tube part part 12b which it intersected perpendicularly and was formed in the flank of this body of tubing 12a, and one fabricates the whole with proper plastics. the base attachment section 12b1 to which branch pipe partial 12b carries out attachment hold of the base 13a of the impregnation valve 13 airtightly the drum section hold section 12b2 which holds drum section 13c of the impregnation valve 13 The point hold section 12b3 which holds point 13e of the impregnation valve 13 having -- this point hold section 12b3 \*\*\*\* -- free passage hole 12b4 which is open for free passage in body of tubing 12a It has formed.

[0016] It considers as the shape of an annular flanged end jutted out outside, and base 13a of the impregnation valve 13 is the seal projected part 13a1 annular to the peripheral face. It has formed in one. To inner skin Annular projected part 13a2 which seal in drum section 13c at the time of insertion of head minor diameter tube part 10a of the body 10 of a syringe is performed, and drum section 13c gets turned up at the time of drawing of head minor diameter tube part 10a of the body 10 of a syringe, and prevents a riser It has formed in one.

[0017] Drum section 13c of the impregnation valve 13 forms press fit section 13b of head minor diameter tube part 10a of the body 10 of a syringe in inner skin. This press fit section 13b In case it considers as the same taper side as the taper of head minor diameter tube part 10a of the body 10 of a syringe and head minor diameter tube part 10a of the body 10 of a syringe is inserted in drum section

13c of the impregnation valve 13 at the time of impregnation of a drug solution etc., it is constituted so that the immersion depth increases, and airtightness may increase.

[0018] Point 13e of the impregnation valve 13 is formed in a single string from drum section 13c, and has 13d of check valves sealed with the negative pressure generated in drum section 13c by drawing of the syringe after impregnation. 13d of this check valve has the annular upper part, as shown in (B) of drawing 1. Although the wall surface of both sides can be made flat towards a head (soffit) and it can consider as the so-called duck bill type which was made to approach mutually gradually, was stuck by the point, and formed straight-line end eye-like head opening in the adhesion part of this point of thing. Cross end eye-like head opening may be formed as other configurations, for example, cone configuration.

[0019] A lid 14 is fabricated in the shape of a cap with the same plastic material as body of tubing 12a of the mixed injection tubing 12, and branching tube part part 12b, and it has syringe insertion hole 14a in the center section, and has annular flange 14b which fits into a perimeter at the upper bed of branching tube part part 12b of the mixed injection tubing 12. Concavo-convex stop section 14c annular into these fitting parts, and 12b5 It is formed.

[0020] When the 1st example of this invention consists of the above configuration and the activity gestalt is explained, it is as follows. First, the inside of drum section 13c is sealed, making head minor diameter tube part 10a of the body 10 of a syringe press fit in press fit section 13b of the drum section 13c inner skin of the impregnation valve 13, and extending the Johan part of drum section 13c caudad a little at the time of impregnation of a drug solution etc. If the piston 11 of a syringe is pressed in this condition and the drug solution within the body 10 of a syringe is extruded from head minor diameter tube part 10a, the internal pressure in drum section 13c rises, 13d of check valves can carry out opening, and they can carry out mixed impregnation of the above-mentioned drug solution into the blood which flows the inside of body of tubing 12a of the mixed injection tubing 12. And when drawing out head minor diameter tube part 10a of the body 10 of a syringe from the inner skin of drum section 13c after impregnation of a drug solution etc., The elongation of the Johan part of drum section 13c is canceled, and point 13e returns up, then negative pressure occurs in drum section 13c. With this negative pressure first, 13d of check valves seals -- having -- then, head minor diameter tube part 10a of the body 10 of a syringe -- annular projected part 13a2 of press fit section 13b of drum section 13c, and base 13a from -- it slips out. Since negative pressure continues in drum section 13c and it is acting in the meantime, 13d of check valves is sealed certainly. And once 13d of check valves is sealed, a back run and leakage of the blood which flows the inside of the mixed injection tubing 12 can be henceforth prevented certainly according to a check valve operation of check valve original, and the sealing maintenance operation by the elastic closedown force.

[0021] The 2nd example of mixed injection tubing of this invention equips with the 2nd impregnation valve 15 which has 15d of check valves airtightly in drum section 13c of the impregnation valve 13 of said 1st example, makes a duplex equip with check valves 13d and 15d, and makes the inner skin of drum section 15c of 15d of inside check valves possess press fit section 15b of head minor diameter tube part 10a of the body 10 of a syringe, as shown in drawing 2. The impregnation valves 13 and 15 of the 2nd example shown in drawing 2 consist of a configuration which used the thing of the 1st example as the duplex as it was, give the same subscript to the same part as the 1st example, and omit detailed explanation.

[0022] According to the configuration of the 2nd example of the above, by pressing head minor diameter tube part 10a of the body 10 of a syringe fit in press fit section 15b in drum section 15c of the inside impregnation valve 15 directly The inside of drum section 15c is caudad sealed for the Johan part of drum section 15c with enlargement a little. In this condition By pressing the piston of a syringe, opening of the 15d of the inside check valves is carried out. Then, opening of the 13d of the outside check valves can be carried out, and the drug solution within the body 10 of a syringe etc. can be poured in into the mixed injection tubing 12. When drawing out head minor diameter tube part 10a of the body 10 of a syringe after impregnation from press fit section 15b in drum section 15c of the inside impregnation valve 15, The elongation of the Johan part of drum section 15c is solved, and point 15e of

the inside impregnation valve 15 returns up. By this the inside of point 13e of the outside impregnation valve 13 -- negative pressure -- generating -- 13d of outside check valves -- sealing -- then, head minor diameter tube part 10a of the body 10 of a syringe -- annular projected part 15a2 of drum section 15c and base 15a from -- by slipping out Negative pressure is generated and 15d of inside check valves is made to seal in drum section 15c. Thus, according to the 2nd example, the check valves 13d and 15d of a duplex can be made to be able to seal first from an outside thing, then an inside thing can be made to seal in order. Therefore, in the 2nd example, a duplex can be made to prevent a back run and leakage of the blood which flows the inside of the mixed injection tubing 12, and a hypodermic needle is made as it is unnecessary.

[0023] As the 3rd example of mixed injection tubing of this invention is shown in drawing 3, only the predetermined distance s contains drum section 15c of the 2nd inside impregnation valve 15 possible [ sliding ] along the press fit direction of the body 10 of a syringe in drum section 13c of the 1st outside impregnation valve 13. In this 3rd example, the base of the 2nd impregnation valve 15 is lost, drum section 15c is made thick the shape of a piston, press fit section 15b is formed in the inner skin of this drum section 15c in the shape of [ the / as the above / same ] a taper, and 15d of check valves is used as the film part projected in the shape of downward radii, and they form head opening of the shape of the shape of a straight-line end eye, and a cross end eye in that soffit center section. And 13f of annular stopper sections in which the omission stop of the 2nd inside impregnation valve 15 is made to perform is formed in the inner skin of base 13a of the 1st outside impregnation valve 13.

[0024] When drawing out head minor diameter tube part 10a of the body 10 of a syringe after impregnation of a drug solution etc. from press fit section 15b of the inner skin of drum section 15c according to the configuration of the 3rd example of the above, Piston-like drum section 15c goes up only for the above-mentioned sliding distance s minutes together with head minor diameter tube part 10a of the body 10 of a syringe. The negative pressure which increased a moved part of this piston can be generated in drum section 13c of the 1st impregnation valve 13. With this negative pressure that increased When 13d of outside check valves is made to seal previously, then head minor diameter tube part 10a of the body 10 of a syringe slips out of press fit section 15b of the inner skin of drum section 15c of the inside impregnation valve 15 Negative pressure occurs in drum section 15c of the inside impregnation valve 15, and 15d of inside check valves seals with this negative pressure. A back run and leakage of the blood which flows the inside of the mixed injection tubing 12 can be made to prevent much more certainly by this.

[0025] The 4th example of mixed injection tubing of this invention installs only predetermined distance movable along the press fit direction of the body 10 of a syringe through diaphragm 15g in drum section 13c of the 1st outside impregnation valve 13, in order to make smoother migration of drum section 15c of the 2nd inside impregnation valve 15, as shown in drawing 4. It is what connected the 2nd base 15a and drum section 15c of the impregnation valve 15 by diaphragm 15g in this 4th example. Press fit section 15b is formed in the inner skin of this drum section 15c in the shape of [ the / as the above / same ] a taper, and 15d of check valves is formed in the inside [ soffit / of drum section 15c ] upper part as a flat film part, and they form head opening of the shape of the shape of a straight-line end eye, and a cross end eye in that soffit center section. In addition, base 13a of the 1st outside impregnation valve 13 omits, and is laying the soffit of base 15a of the 2nd inside impregnation valve 15 in the upper bed of drum section 13c.

[0026] If head minor diameter tube part 10a of the body 10 of a syringe is pressed fit in press fit section 15b of drum section 15c of the inside impregnation valve 15 according to the 4th example of the above If the inside of drum section 15c and drum section 13c of the outside impregnation valve 13 is also sealed and head minor diameter tube part 10a of the body 10 of a syringe is pushed in further Drum section 15c moves diaphragm 15g to a predetermined distance lower part with tension caudad, and, thereby, head minor diameter tube part 10a of the body 10 of a syringe is deeply pressed fit in drum section 15c in the drum section 13c soffit of the 1st impregnation valve 13. If the syringe piston 11 is pressed and the drug solution within the body 10 of a syringe etc. is extruded in this condition 15d of inside check valves carries out opening, then 13d of outside check valves carries out opening. When it

can pour in into the mixed injection tubing 12 and head minor diameter tube part 10a of the body 10 of a syringe is drawn out after impregnation from press fit section 15b in drum section 15c of the inside impregnation valve 15, It goes up together with head minor diameter tube part 10a of the body 10 of a syringe until drum section 15c of the inside impregnation valve 15 hits up and the upper bed hits a lid 14 with tension in diaphragm 15g. By this Negative pressure occurs in drum section 13c of the 1st outside impregnation valve 13, and 13d of outside check valves seals previously. Then, if head minor diameter tube part 10a of the body 10 of a syringe is pulled, drum section 15c to inside head minor diameter tube part 10a will be drawn out, by this, negative pressure occurs in inside drum section 15c, and 15d of inside check valves seals. A back run and leakage of the blood which flows the inside of the mixed injection tubing 12 can be made to prevent much more certainly by this. In addition, you may make it regulate in the 4th example shown in drawing 4 , so that it may protrude downward and inside drum section 15c may not go up a stopper (graphic display abbreviation) to the inner circumference underside of a lid 14 beyond the need.

[0027] Base 15a by which attachment hold of the 5th example of mixed injection tubing of this invention is airtightly carried out in the 2nd impregnation valve 15 to branch pipe partial 12b of the flank of body of tubing 12a as shown in (A) of drawing 5 , Drum section 15c which has the body 10 of a syringe, or its press fit section 15b of head minor diameter tube part 10a in inner skin, It constitutes from a check valve 16 sealed with the negative pressure generated in drum section 15c by drawing of the syringe after impregnation. Drum section 15c is met in the press fit direction of the body 10 of a syringe within this base 15a through diaphragm 15g to base 15a of said 2nd impregnation valve 15. Predetermined distance, It installs movable, and the check valve 16 of said 2nd impregnation valve 15 is used as another object, and periphery section 16c of the check valve 16 concerned is made to pinch by drum section 13c of the 1st impregnation valve 13, and base 15a of the 2nd impregnation valve 15. As the check valve 16 of the 2nd impregnation valve 15 is shown in (A) of drawing 5 , and (B) It consists of central valve section 16a which rose in the shape of a cone, and annular periphery section 16c connected through two or more rib 16b from this central valve section 16a. Central valve section 16a It is pushed in by the elastic stability of rib 16b in drum section 15c from the soffit of drum section 15c, is closed down in contact with the soffit inner skin of drum section 15c, and prevents that blood flows backwards the inside of drum section 15c of the 2nd impregnation valve 15 from this part. In order to make certain a closeout operation of central valve section 16a, in the state of no-load, central valve section 16a is made to press down caudad a little, precompression is given by the soffit of drum section 15c, and the closeout operation of the check valve 16 by elastic repulsive force is raised. A closing motion operation of central valve section 16a is constituted so that the thickness of rib 16b, width of face, die length, etc. may be set up proper and it may operate smoothly. In addition, in order to prevent that head opening of head minor diameter tube part 10a of the body 10 of a syringe is closed by the cone-like point of central valve section 16a, 16d of two or more protruding lines is formed in the perimeter of the cone-like point of central valve section 15a at the radial.

[0028] According to the 5th example of the above, by pressing head minor diameter tube part 10a of the body 10 of a syringe fit in press fit section 15b of drum section 15c of the 2nd impregnation valve 15 at the time of impregnation of a drug solution etc. Extending diaphragm 15g, drum section 15c is depressed caudad and the inside of drum section 15c is sealed. In this condition By pressing the piston of a syringe, central valve section 16a of the inside check valve 16 is depressed caudad, and can carry out opening, then opening of the 13d of the outside check valves can be carried out, and the drug solution within the body 10 of a syringe etc. can be poured in into the mixed injection tubing 12. When drawing out head minor diameter tube part 10a of the body 10 of a syringe out of drum section 15c of the inside impregnation valve 15 after impregnation, It goes up, while drum section 15c extends diaphragm 15g upward together with a syringe. By this Let window hole 16e between rib 16b of a check valve 16 pass, and first, in point 13e of the 1st impregnation valve 13, negative pressure occurs and 13d of outside check valves seals. Then, when head minor diameter tube part 10a of the body 10 of a syringe slips out of drum section 15c, generate negative pressure, the soffit inner skin of drum section 15c is made to stick central valve section 16a of the inside check valve 16 in drum section 15c, and the closedown of



the 2nd check valve 16 is carried out. Thus, according to the 5th example, the check valves 13d and 16 of a duplex can be made to be able to seal first from an outside thing, then an inside thing can be made to seal in order. Therefore, also in the 5th example, a duplex can be made to prevent a back run and leakage of the blood which flows the inside of the mixed injection tubing 12, and a hypodermic needle is made as it is unnecessary. In addition, you may make it regulate in the 5th example shown in drawing 5, so that it may protrude downward and inside drum section 15c may not go up a stopper (graphic display abbreviation) to the inner circumference underside of a lid 14 beyond the need.

[0029] Although the example of mixed injection tubing of this invention is above, the concrete configuration of a check valve is not restrained by the example of a graphic display, but as long as it is the configuration which is made to generate negative pressure and is made to seal at the time of drawing of a syringe, it may change and it may be carried out.

[0030]

[Effect of the Invention] It is not necessary to use a hypodermic needle and, according to invention of claim 1, mixed impregnation of the drug solution within the body of a syringe etc. can be carried out at accuracy into the blood which flows the inside of the body of tubing of mixed injection tubing at the time of impregnation of a drug solution etc. And after impregnation can make a back run and leakage of blood prevent certainly.

[0031] According to invention of claim 2, a duplex can be made to prevent a back run and leakage of blood.

[0032] According to invention of claims 3, 4, and 5, a back run and leakage of blood can be made to prevent much more certainly.

[0033] Once being able to make the sealing action of the check valve by the negative pressure in a drum section perform softly smoothly and sealing it, a back run and leakage of blood can be made to prevent certainly according to a check valve operation of check valve original, and the sealing maintenance operation by the elastic closedown force according to invention of claim 6.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] (A) shows the vertical section side elevation showing the 1st example of mixed injection tubing concerning this invention, and (B) with the front view of the check valve part of a duck bill mold, and shows a right half in a cross section.

[Drawing 2] The vertical section side elevation showing the 2nd example concerning this invention.

[Drawing 3] The vertical section side elevation showing the 3rd example concerning this invention.

[Drawing 4] The vertical section side elevation showing the 4th example concerning this invention.

[Drawing 5] For (A), the vertical section side elevation showing the 5th example concerning this invention and (B) are the top view of the check valve simple substance of the 2nd impregnation valve.

[Drawing 6] The explanatory view of the blood circuits of an artificial kidney.

[Description of Notations]

1 Patient

2 Derivation Circuit

3 Pump

4 Controller

5 Dialyzer

6 Dialysing Fluid

7 The Conventional Mixed Injection Tubing

8 Return Circuit

10 Body of Syringe

10a Head minor diameter tube part

11 Piston of Syringe

12 Mixed Injection Tubing

12a The body of tubing

12b Branch pipe part

13 Impregnation Valve

13a Base

13b Press fit section

13c Drum section

13d Check valve

13e Point

13f Stopper section

14 Lid

15 2nd Impregnation Valve

15a Base

15b Press fit section

15c Drum section

15d Inside check valve

15e Point

15g Diaphram

16 Check Valve of Inside Another Object

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[Translation done.]

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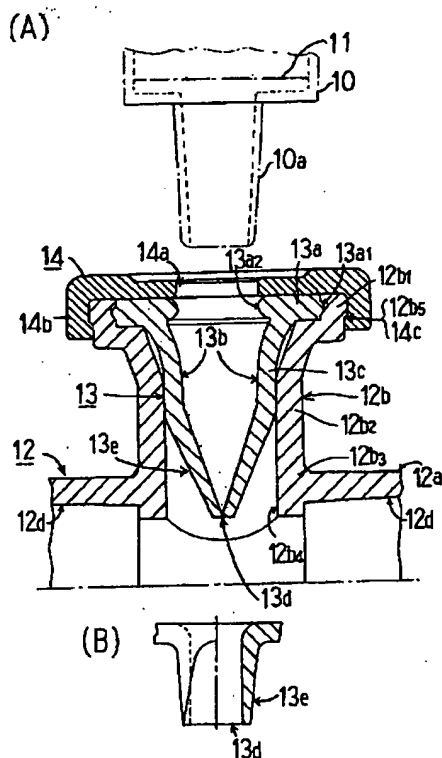
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(54) 【発明の名称】 混注管

(57) 【要約】

【課題】 注射針を不要とし、血液の逆流も皆無とし得る混注管を提供すること。

【解決手段】 管本体12aの側部の分岐管部分12bに気密に嵌着收容される基部13aと、内周面に注射器本体10又はその先端小径管部10aの圧入部13bを有する胴部13cと、注入後の注射器の引抜きにより胴部13c内に発生する負圧で密閉する逆止弁13eを有する先端部13fとからなる注入弁13を混注管12の分岐管部分12bに蓋体14を介して装着した。



## 【特許請求の範囲】

【請求項1】 管本体の側部の分岐管部分に気密に嵌着収容される基部と、内周面に注射器本体又はその先端小径管部の圧入部を有する胴部と、注入後の注射器の引抜きにより胴部内に発生する負圧で密閉する逆止弁を有する先端部とからなる注入弁を具備したことを特徴とする混注管。

【請求項2】 前記注入弁の胴部内に逆止弁を有する第2の注入弁を気密に装着して逆止弁を二重に装備させ、注射器の引抜き時に負圧を発生させるために、内側の第2の注入弁の胴部内周面に注射器本体又はその先端小径管部の圧入部を具備させたことを特徴とする請求項1に記載の混注管。

【請求項3】 前記内側の逆止弁を有する第2の注入弁を外側の逆止弁を有する第1の注入弁の胴部内に注射器本体の圧入方向に沿って所定距離、摺動可能に収納したことを特徴とする請求項2に記載の混注管。

【請求項4】 前記第2の注入弁をダイヤフラムを介して第1の注入弁の胴部内に注射器本体の圧入方向に沿って所定距離、移動可能に設置したことを特徴とする請求項2に記載の混注管。

【請求項5】 前記第2の注入弁を、管本体の側部の分岐管部分に気密に嵌着収容される基部と、内周面に注射器本体又はその先端小径管部の圧入部を有する胴部と、注入後の注射器の引抜きにより胴部内に発生する負圧で密閉する逆止弁とで構成し、前記第2の注入弁の基部に対して胴部をダイヤフラムを介して該基部内で注射器本体の圧入方向に沿って所定距離、移動可能に設置し、かつ、前記第2の注入弁の逆止弁を別体とし、当該逆止弁の周縁部を第1の注入弁の胴部と第2の注入弁の基部とで挟持させたことを特徴とする請求項2に記載の混注管。

【請求項6】 前記注入弁をゴム等の弾性材料で形成したことを特徴とする請求項1～5の何れかに記載の混注管。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、人工腎臓の血液回路、点滴回路等に薬液その他の液体を注入する場合に使用する混注管に関するものである。

## 【0002】

【従来の技術】 例えば、人工腎臓は、図6に示すように、患者1の一部から導出配管2、ポンプ3、コントローラ4を経由して透析器5に導出した血液を、透析器5内で血液と透析液6との浸透圧の差を利用して、血液より老廃物を除去して患者1の体内に戻すもので、混注管7は、例えば、透析器5からの戻し配管8の途中や導出配管2の途中に接続される。

【0003】 従来の混注管7は、T字管形状をなす管本体の側部に形成された分岐管部分内にゴム栓を気密に嵌

合し、このゴム栓部分に、これを通ずるように注射針を差込んで注射器本体内の薬液等を注入していた。

## 【0004】

【発明が解決しようとする課題】 上記従来の混注管7は、注射針を用いて薬液等を注入する必要があり、その分、コスト高となり、しかも、使用済みの注射針は、患者の血液の付着汚染のため廃棄上に問題があり、また、この使用済み注射針の誤射等による院内感染の問題等もあった。

【0005】 そこで、本発明は、注射針を不要とし、血液の漏洩等も皆無とし得る混注管を提供することを目的としている。

## 【0006】

【課題を解決するための手段】 上記目的を達成するため本発明の混注管は、管本体の側部の分岐管部分に気密に嵌着収容される基部と、内周面に注射器本体又はその先端小径管部の圧入部を有する胴部と、注入後の注射器の引抜きにより胴部内に発生する負圧で密閉する逆止弁を有する先端部とからなる注入弁を具備したことを特徴とするものである。

【0007】 本発明は、薬液等の注入時、注射器本体の先端小径管部を注入弁の胴部内周面の圧入部に圧入させて胴部内を密封し、この状態で注射器のピストンを押圧して注射器本体内の薬液等を先端小径管部から押し出せば、胴部内の内圧が上昇し、逆止弁の先端開口部が開いて、混注管の管本体内を流れる血液中に上記薬液等を混合注入することができる。そして、注入後は、注射器を胴部内周面から引抜く際、胴部内に負圧が発生し、この負圧により、逆止弁の先端開口部が確実に密閉されるため、血液の逆流や漏洩を確実に阻止することができる。これにより、本発明の混注管は、注射針を不要とでき、かつ、血液の逆流も皆無とできる。

【0008】 また、本発明の混注管は、前記注入弁の胴部内に逆止弁を有する第2の注入弁を気密に装着して逆止弁を二重に装備させ、注射器の引抜き時に負圧を発生させるために、内側の逆止弁を有する第2の注入弁の胴部内周面に注射器本体又はその先端小径管部の圧入部を具備させたことを特徴とするものである。この構成によって、薬液等の注入後、注射器を胴部内周面から引抜く際、まず、第1の注入弁の逆止弁を密閉させ、続いて、第2の注入弁の胴部内に負圧を発生させて第2の注入弁の逆止弁を密閉させて、血液の逆流や漏洩を二重に防止させることができる。

【0009】 さらに、本発明の混注管は、前記内側の逆止弁を有する第2の注入弁を外側の逆止弁を有する第1の注入弁の胴部内に注射器本体の圧入方向に沿って所定距離、摺動可能に収納したことを特徴とするものである。この構成によって、薬液等の注入後、注射器を胴部内周面から引抜く際、第1の注入弁の胴部内に上記摺動距離分だけ増大した負圧を発生させることができ、この

増大した負圧により、先ず、第1の注入弁の逆止弁を密閉させ、続いて、第2の注入弁の胴部内に負圧を発生させて第2の注入弁の逆止弁を密閉させて、血液の逆流や漏洩を二重に防止し、一層確実なものとすることができる。

【0010】また、本発明の混注管は、前記第2の注入弁をダイヤフラムを介して第1の注入弁の胴部内に注射器本体の圧入方向に沿って所定距離、移動可能に設置したことを特徴とするものである。この構成によって、薬液等の注入後、注射器を胴部内周面から引抜く際、第1の注入弁の胴部内にダイヤフラムを介して設置された第2の注入弁の上記移動距離分だけ増大した負圧を発生させることができ、この増大した負圧により、先ず、第1の注入弁の逆止弁を密閉させ、続いて、第2の注入弁の胴部内に負圧を発生させて第2の注入弁の逆止弁を密閉させて、血液の逆流や漏洩を二重に防止し、一層確実なものとすることができる。

【0011】また、本発明の混注管は、第2の注入弁を、管本体の側部の分岐管部分に気密に嵌着收容される基部と、内周面に注射器本体又はその先端小径管部の圧入部を有する胴部と、注入後の注射器の引抜きにより胴部内に発生する負圧で密閉する逆止弁とで構成し、前記第2の注入弁の基部に対して胴部をダイヤフラムを介して該基部内で注射器本体の圧入方向に沿って所定距離、移動可能に設置し、かつ、前記第2の注入弁の逆止弁を別体とし、当該逆止弁の周縁部を第1の注入弁の胴部と第2の注入弁の基部とで挟持させたことを特徴とするものである。この構成によって、薬液等の注入時、注射器本体の先端小径管部を第2の注入弁の胴部の圧入部に圧入することにより、ダイヤフラムを引き伸ばしながら胴部を下方に押し下げて胴部内を密封し、この状態で、注射器のピストンを押圧することにより、内側の逆止弁を開口させ、続いて、外側の逆止弁を開口させて、注射器本体内の薬液等を混注管内に注入することができる。注入後、注射器本体の先端小径管部を内側の注入弁の胴部内から引抜くとき、最初、胴部が注射器と一緒にダイヤフラムを上向きに引き伸ばしながら上昇し、これによって、先ず、第1の注入弁の先端部内に負圧が発生して外側の逆止弁が密閉し、続いて、注射器本体の先端小径管部が胴部から抜け出していくことにより、胴部内に負圧を発生させて内側の逆止弁を密閉させ、これと同時にダイヤフラムが内側の逆止弁を弾性作用によっても閉止させる。このように、第5実施例によれば、二重の逆止弁を外側のものから先に密閉させ、続いて、内側のものを順番に密閉させることができる。従って、第5実施例においても、混注管内を流れる血液の逆流や漏洩を二重に防止させることができ、注射針を不要とできる。

【0012】さらに、本発明は、前記注入弁をゴム等の弾性材料で一体に形成してなるものである。この構成により、胴部内の負圧による逆止弁の密閉作用をソフトに

スムーズに行わせることができ、一旦、密閉した後は、逆止弁本来の逆止弁作用と弾性閉止力による密閉保持作用とによって、血液の逆流や漏洩を確実に阻止させることができる。

### 【0013】

【発明の実施の形態】以下、本発明に係る混注管の実施の態様を図面に基づいて説明する。図1の(A)は本発明に係る混注管の第1実施例を示す縦断側面図、図1の(B)は逆止弁部分の正面図で右半分は断面で示す。図2は本発明に係る第2実施例を示す縦断側面図、図3は本発明に係る第3実施例を示す縦断側面図、図4は本発明に係る第4実施例を示す縦断側面図、図5の(A)は本発明に係る第5実施例を示す縦断側面図、(B)は第2の注入弁の逆止弁単体の平面図である。

【0014】先ず、本発明の混注管の第1実施例は、図1の(A)に示すように、混注管12の管本体12aの側部の分岐管部分12bに気密に嵌着收容される基部13aと、内周面に注射器本体10の先端小径管部10aの圧入部13bを有する胴部13cと、注入後の注射器の引抜きにより胴部13c内に発生する負圧で密閉する逆止弁13dを有する先端部13eとからなり、これら各部をゴム等の弾性材料で一体に形成してなる注入弁13を混注管12の分岐管部分12bに蓋体14を介して装着したものである。

【0015】混注管12は、両端に血液回路のパイプ(図示省略)を圧入接合するパイプ挿入口12d、12dを形成した管本体12aと、この管本体12aの側部に直交して形成した分岐管部分12bとからなり、全体を適宜のプラスチックで一体に成形されている。分岐管部分12bは、注入弁13の基部13aを気密に嵌着收容する基部嵌着部12b<sub>1</sub>と、注入弁13の胴部13cを收容する胴部收容部12b<sub>2</sub>と、注入弁13の先端部13eを收容する先端部收容部12b<sub>3</sub>とを有し、この先端部收容部12b<sub>3</sub>には、管本体12a内に連通する連通孔12b<sub>4</sub>が形成してある。

【0016】注入弁13の基部13aは、外側に張出した環状のフランジ形状とされ、その外周面に環状のシール突部13a<sub>1</sub>が一体に形成してあり、内周面には、注射器本体10の先端小径管部10aの挿入時の胴部13c内の密封を行い、かつ、注射器本体10の先端小径管部10aの引抜き時、胴部13cの捲れ上りを防止する環状の突部13a<sub>2</sub>が一体に形成してある。

【0017】注入弁13の胴部13cは、内周面に注射器本体10の先端小径管部10aの圧入部13bを形成しており、この圧入部13bは、注射器本体10の先端小径管部10aのテーパと同様なテーパ面とされ、薬液等の注入時に、注射器本体10の先端小径管部10aを注入弁13の胴部13cに挿入する際、挿入深さが増加するほど気密性が高まるように構成されている。

【0018】注入弁13の先端部13eは、胴部13c

から一連に形成され、注入後の注射器の引抜きにより胴部 13c 内に発生する負圧で密閉する逆止弁 13d を有する。この逆止弁 13d は、例えば、図 1 の (B) に示すように、上部が環状で、先端（下端）に向けて両側の壁面を扁平にして相互に次第に接近させ、先端部で密着させ、この先端部の密着部分に直線切り目状の先端開口部を形成した、所謂、ダックビル型のものとする事ができるが、他の形状、例えば、円錐形状として、十文字切り目状の先端開口部を形成してもよい。

【0019】蓋体 14 は、混注管 12 の管本体 12a 及び分岐管部分 12b と同様なプラスチック材料でキャップ状に形成され、中央部に注射器挿入孔 14a を有し、周囲に、混注管 12 の分岐管部分 12b の上端に嵌合する環状フランジ部 14b を有する。これらの嵌合部分には、環状の凹凸係止部 14c、12b が形成されている。

【0020】本発明の第 1 実施例は以上の構成からなり、その使用形態を説明すると次の通りである。先ず、薬液等の注入時、注射器本体 10 の先端小径管部 10a を注入弁 13 の胴部 13c 内周面の圧入部 13b に圧入させて胴部 13c の上半部分を若干下方に引き伸ばしながら胴部 13c 内を密封し、この状態で注射器のピストン 11 を押圧して注射器本体 10 内の薬液を先端小径管部 10a から押し出せば、胴部 13c 内の内圧が上昇して逆止弁 13d が開口して、混注管 12 の管本体 12a 内を流れる血液の中に上記薬液を混合注入することができる。そして、薬液等の注入後、注射器本体 10 の先端小径管部 10a を胴部 13c の内周面から引抜く際、胴部 13c の上半部分の伸びが解消されて先端部 13e が上方に復帰し、続いて、胴部 13c 内に負圧が発生し、この負圧により、先ず、逆止弁 13d が密閉され、続いて、注射器本体 10 の先端小径管部 10a が胴部 13c の圧入部 13b 及び基部 13a の環状の突部 13a<sub>2</sub> から抜け出していく。この間、胴部 13c 内には負圧が継続して作用しているため、逆止弁 13d は確実に密閉される。そして、逆止弁 13d は、一旦、密閉されると、以後は、逆止弁本来の逆止弁作用と弾性閉止力による密閉保持作用とによって、混注管 12 内を流れる血液の逆流や漏洩を確実に阻止することができる。

【0021】本発明の混注管の第 2 実施例は、図 2 に示すように、前記第 1 実施例の注入弁 13 の胴部 13c 内に、逆止弁 15d を有する第 2 の注入弁 15 を気密に装着して逆止弁 13d、15d を二重に装備させ、内側の逆止弁 15d の胴部 15c の内周面に注射器本体 10 の先端小径管部 10a の圧入部 15b を具備させたものである。図 2 に示す第 2 実施例の注入弁 13、15 は、第 1 実施例のものをそのまま二重にしたような構成からなり、第 1 実施例と同一部分には同一の添字を付して詳細な説明を省略する。

【0022】上記第 2 実施例の構成によれば、注射器本

体 10 の先端小径管部 10a を直接、内側の注入弁 15 の胴部 15c 内の圧入部 15b に圧入することにより、胴部 15c の上半部分を下方に若干引き伸ばしながら胴部 15c 内を密封し、この状態で、注射器のピストンを押圧することにより、内側の逆止弁 15d を開口させ、続いて、外側の逆止弁 13d を開口させて、注射器本体 10 内の薬液等を混注管 12 内に注入することができ、注入後、注射器本体 10 の先端小径管部 10a を内側の注入弁 15 の胴部 15c 内の圧入部 15b から引抜くとき、胴部 15c の上半部分の伸びが解消して内側の注入弁 15 の先端部 15e が上方に復帰し、これにより、外側の注入弁 13 の先端部 13e 内に負圧が発生して外側の逆止弁 13d が密閉し、続いて、注射器本体 10 の先端小径管部 10a が胴部 15c 及び基部 15a の環状の突部 15a<sub>2</sub> から抜け出していくことにより、胴部 15c 内に負圧を発生させて内側の逆止弁 15d を密閉させる。このように、第 2 実施例によれば、二重の逆止弁 13d、15d を外側のものから先に密閉させ、続いて、内側のものを順番に密閉させることができる。従って、第 2 実施例においては、混注管 12 内を流れる血液の逆流や漏洩を二重に防止させることができ、注射針を不要とできる。

【0023】本発明の混注管の第 3 実施例は、図 3 に示すように、内側の第 2 の注入弁 15 の胴部 15c を外側の第 1 の注入弁 13 の胴部 13c 内に注射器本体 10 の圧入方向に沿って所定距離 s だけ摺動可能に収納したものである。この第 3 実施例においては、第 2 の注入弁 15 の基部を無くし、胴部 15c をピストン状に分厚くし、この胴部 15c の内周面に圧入部 15b を前記と同様なテーパ状に形成し、また、逆止弁 15d は、下向き円弧状に突き出した膜部分とし、その下端中央部に直線切り目状又は十文字切り目状の先端開口部を形成したものである。そして、外側の第 1 の注入弁 13 の基部 13a の内周面には、内側の第 2 の注入弁 15 の抜け止めを行わせる環状のストッパー部 13f を形成している。

【0024】上記第 3 実施例の構成によれば、薬液等の注入後、注射器本体 10 の先端小径管部 10a を胴部 15c の内周面の圧入部 15b から引抜く際、ピストン状の胴部 15c が上記摺動距離 s 分だけ注射器本体 10 の先端小径管部 10a と一緒に上昇して、このピストンの移動分だけ増大した負圧を第 1 の注入弁 13 の胴部 13c 内に発生させることができ、この増大した負圧により、外側の逆止弁 13d を先に密閉させ、続いて、注射器本体 10 の先端小径管部 10a が内側の注入弁 15 の胴部 15c の内周面の圧入部 15b から抜け出すことにより、内側の注入弁 15 の胴部 15c 内に負圧が発生し、この負圧により、内側の逆止弁 15d が密閉する。これによって、混注管 12 内を流れる血液の逆流や漏洩を一層確実に阻止させることができる。

【0025】本発明の混注管の第 4 実施例は、図 4 に示

すように、内側の第2の注入弁15の胴部15cの移動をより円滑にするために、外側の第1の注入弁13の胴部13c内にダイヤフラム15gを介して注射器本体10の圧入方向に沿って所定距離だけ移動可能に設置したものである。この第4実施例においては、第2の注入弁15の基部15aと胴部15cとをダイヤフラム15gで連結したもので、この胴部15cの内周面に圧入部15bを前記と同様なテーパ状に形成し、また、逆止弁15dは、胴部15cの下端より内側上方に平坦な膜部分として形成し、その下端中央部に直線切り目状又は十文字切り目状の先端開口部を形成したものである。なお、外側の第1の注入弁13の基部13aは省略し、胴部13cの上端に内側の第2の注入弁15の基部15aの下端を載置している。

【0026】上記第4実施例によれば、注射器本体10の先端小径管部10aを内側の注入弁15の胴部15cの圧入部15bに圧入すると、胴部15c内及び外側の注入弁13の胴部13c内も密封され、注射器本体10の先端小径管部10aをさらに押し込むと、胴部15cがダイヤフラム15gを下方に引張りながら所定距離下方に移動して第1の注入弁13の胴部13c下端に当たり、これにより、注射器本体10の先端小径管部10aが胴部15c内に深く圧入される。この状態で、注射器ピストン11を押圧して注射器本体10内の薬液等を押し出せば、内側の逆止弁15dが開口し、続いて、外側の逆止弁13dが開口して、混注管12内に注入することができ、注入後、注射器本体10の先端小径管部10aを内側の注入弁15の胴部15c内の圧入部15bから引抜くとき、内側の注入弁15の胴部15cがダイヤフラム15gを上方に引張りながら、その上端が蓋体14に当るまで注射器本体10の先端小径管部10aと一緒に上昇し、これによって、外側の第1の注入弁13の胴部13c内に負圧が発生し、外側の逆止弁13dが先に密閉する。続いて、注射器本体10の先端小径管部10aを引張ると内側の胴部15cから先端小径管部10aが引抜かれ、これによって、内側の胴部15c内に負圧が発生し、内側の逆止弁15dが密閉する。これによって、混注管12内を流れる血液の逆流や漏洩を一層確実に阻止させることができる。なお、図4に示す第4実施例において、蓋体14の内周下面にストッパー（図示省略）を下方に突設して内側の胴部15cが必要以上に上がらないように規制させてもよい。

【0027】本発明の混注管の第5実施例は、図5の（A）に示すように、第2の注入弁15を、管本体12aの側部の分岐管部分12bに気密に嵌着収容される基部15aと、内周面に注射器本体10又はその先端小径管部10aの圧入部15bを有する胴部15cと、注入後の注射器の引抜きにより胴部15c内に発生する負圧で密閉する逆止弁16とで構成し、前記第2の注入弁15の基部15aに対して胴部15cをダイヤフラム15

gを介して該基部15a内で注射器本体10の圧入方向に沿って所定距離、移動可能に設置し、かつ、前記第2の注入弁15の逆止弁16を別体とし、当該逆止弁16の周縁部16cを第1の注入弁13の胴部13cと第2の注入弁15の基部15aとで挟持させたものである。第2の注入弁15の逆止弁16は、図5の（A）（B）に示すように、円錐状に盛り上がった中央弁膜部16aと、この中央弁膜部16aから複数本のリブ16bを介して連結された環状の周縁部16cとからなり、中央弁膜部16aは、胴部15cの下端から胴部15c内にリブ16bの弾性復元力で押し込まれ、胴部15cの下端内周面に当接して閉鎖し、この部分から血液が第2の注入弁15の胴部15c内を逆流することを防止するものである。中央弁膜部16aの閉鎖作用を確実化するために、無負荷の状態、胴部15cの下端により、中央弁膜部16aを若干下方に圧下させて予圧を付与し、弾性反発力による逆止弁16の閉鎖作用を向上させている。中央弁膜部16aの開閉作用は、リブ16bの厚さ、幅、長さ等を適正に設定して円滑に動作するように構成される。なお、注射器本体10の先端小径管部10aの先端開口部が中央弁膜部16aの円錐状先端部によって塞がるのを防止するために、複数本の突条16dを中央弁膜部15aの円錐状先端部の周囲に放射状に形成している。

【0028】上記第5実施例によれば、薬液等の注入時、注射器本体10の先端小径管部10aを第2の注入弁15の胴部15cの圧入部15bに圧入することにより、ダイヤフラム15gを引き伸ばしながら胴部15cを下方に押し下げて胴部15c内を密封し、この状態で、注射器のピストンを押圧することにより、内側の逆止弁16の中央弁膜部16aを下方に押し下げて開口させ、続いて、外側の逆止弁13dを開口させて、注射器本体10内の薬液等を混注管12内に注入することができる。注入後、注射器本体10の先端小径管部10aを内側の注入弁15の胴部15c内から引抜くとき、胴部15cが注射器と一緒にダイヤフラム15gを上向きに引き伸ばしながら上昇し、これによって、逆止弁16のリブ16bの間の窓孔16eを通して、先ず、第1の注入弁13の先端部13e内に負圧が発生して外側の逆止弁13dが密閉し、続いて、注射器本体10の先端小径管部10aが胴部15cから抜け出していくことにより、胴部15c内に負圧を発生させて内側の逆止弁16の中央弁膜部16aを胴部15cの下端内周面に密着させ、第2の逆止弁16を閉止させる。このように、第5実施例によれば、二重の逆止弁13d、16を外側のものから先に密閉させ、続いて、内側のものを順番に密閉させることができる。従って、第5実施例においても、混注管12内を流れる血液の逆流や漏洩を二重に防止させることができ、注射針を不要とできる。なお、図5に示す第5実施例において、蓋体14の内周下面にストッ



パー（図示省略）を下向きに突設して内側の胴部15cが必要以上に上がらないように規制させてもよい。

【0029】本発明の混注管の実施例は、以上であるが、逆止弁の具体的な形状は、図示例に制約されず、注射器の引抜き時に負圧を発生させて密閉させる構成であれば、変更して実施してもよい。

#### 【0030】

【発明の効果】請求項1の発明によれば、薬液等の注入時、注射針を使用する必要がなく、注射器本体内の薬液等を混注管の管本体内部を流れる血液中に正確に混合注入することができる。そして、注入後は、血液の逆流や漏洩を確実に防止させることができる。

【0031】請求項2の発明によれば、血液の逆流や漏洩を二重に防止させることができる。

【0032】請求項3、4及び5の発明によれば、血液の逆流や漏洩を一層確実に阻止させることができる。

【0033】請求項6の発明によれば、胴部内の負圧による逆止弁の密閉作用をソフトにスムーズに行わせることができ、一旦、密閉した後は、逆止弁本来の逆止弁作用と弾性閉止力による密閉保持作用とによって、血液の逆流や漏洩を確実に阻止させることができる。

#### 【図面の簡単な説明】

【図1】（A）は本発明に係る混注管の第1実施例を示す縦断側面図、（B）はダックビル型の逆止弁部分の正面図で右半分は断面で示す。

【図2】本発明に係る第2実施例を示す縦断側面図。

【図3】本発明に係る第3実施例を示す縦断側面図。

【図4】本発明に係る第4実施例を示す縦断側面図。

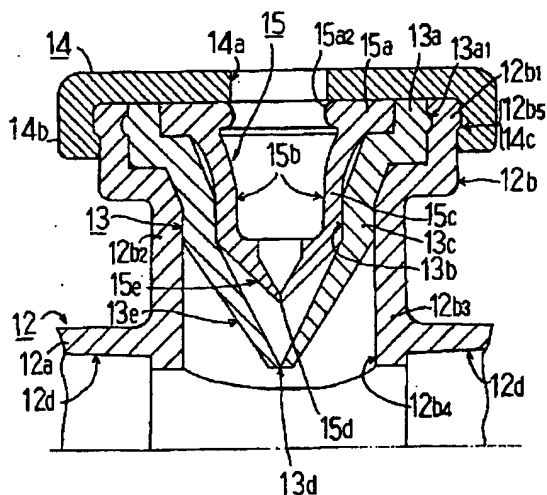
【図5】（A）は本発明に係る第5実施例を示す縦断側面図、（B）は第2の注入弁の逆止弁単体の平面図。

【図6】人工腎臓の血液回路の説明図。

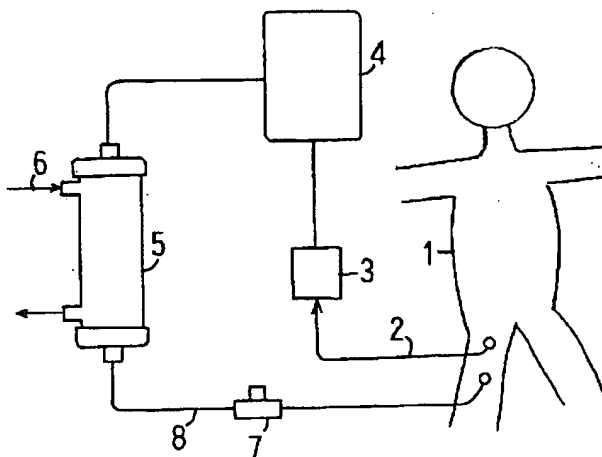
#### 【符号の説明】

- |     |           |
|-----|-----------|
| 1   | 患者        |
| 2   | 導出回路      |
| 3   | ポンプ       |
| 4   | コントローラ    |
| 5   | 透析器       |
| 6   | 透析液       |
| 7   | 従来の混注管    |
| 8   | 戻し回路      |
| 10  | 10 注射器本体  |
| 10a | 先端小径管部    |
| 11  | 注射器のピストン  |
| 12  | 混注管       |
| 12a | 管本体       |
| 12b | 分岐管部分     |
| 13  | 注入弁       |
| 13a | 基部        |
| 13b | 圧入部       |
| 13c | 胴部        |
| 13d | 逆止弁       |
| 13e | 先端部       |
| 13f | ストッパー部    |
| 14  | 蓋体        |
| 15  | 第2の注入弁    |
| 15a | 基部        |
| 15b | 圧入部       |
| 15c | 胴部        |
| 15d | 内側の逆止弁    |
| 15e | 先端部       |
| 15g | ダイヤフラム    |
| 16  | 内側の別体の逆止弁 |

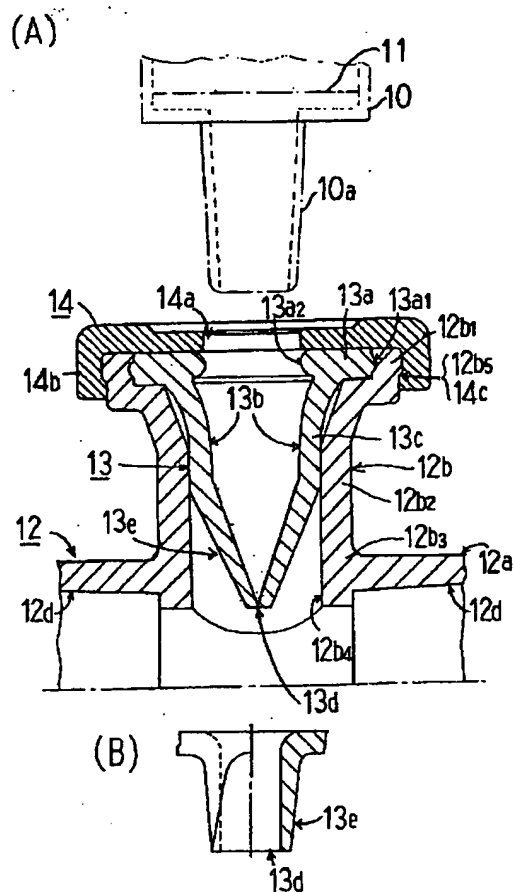
【図2】



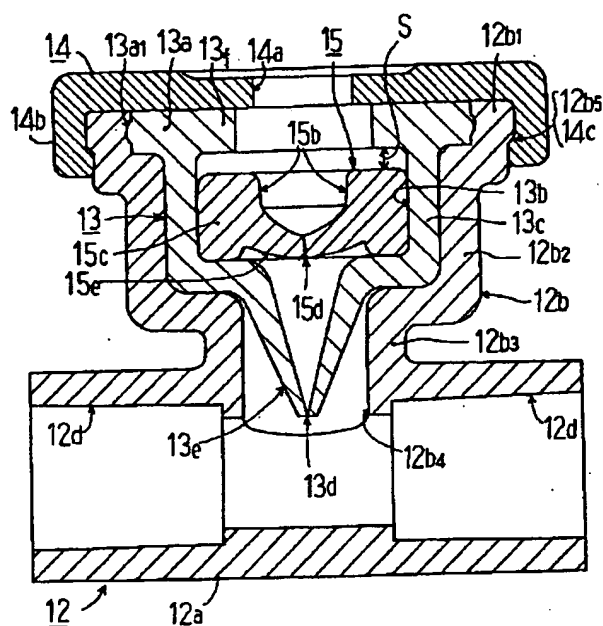
【図6】



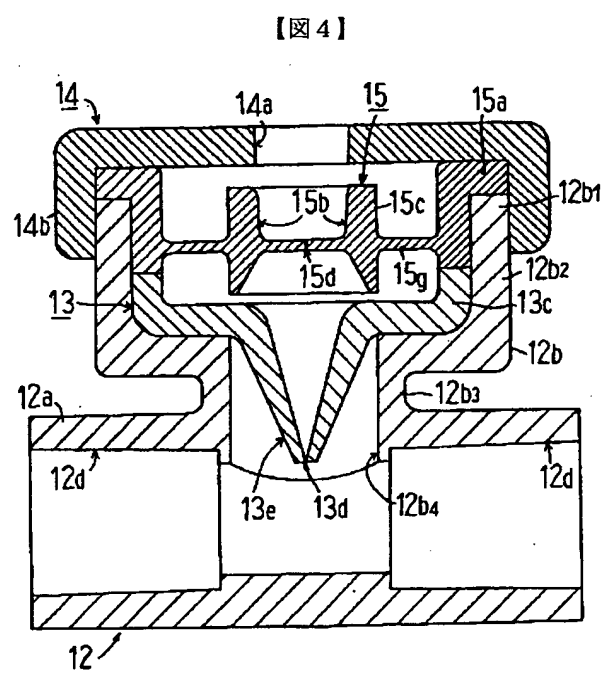
【図 1】



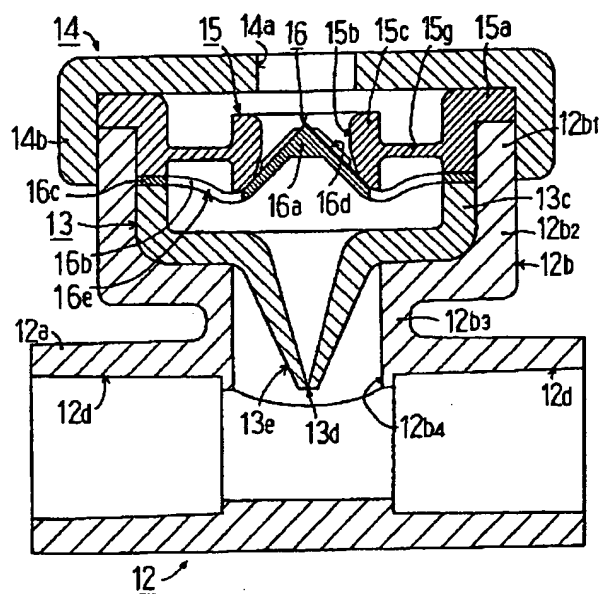
【図 3】



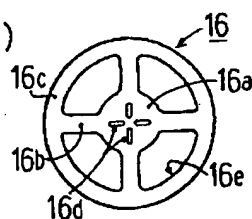
【図 5】



(A)



(B)



フロントページの続き

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